

What is claimed is:

1. A method of controlling cooling fluid provisioning in a room housing a plurality of components, said room including at least one plenum having one or more cooling system components configured to vary a characteristic of at least one of cooling fluid supply to and
5 removal from the room, said method comprising:

positioning location aware sensors at various locations in the room;

determining the locations of the location aware sensors;

detecting one or more conditions with the location aware sensors;

determining whether to manipulate at least one of the one or more cooling system
10 components to modify a characteristic of cooling fluid contained in the plenum based upon the detected one or more conditions; and

manipulating at least one of the one or more cooling system components in response to a determination to that the at least of the one or more cooling system components is to be modified.

15 2. The method according to claim 1, wherein the step of determining the location of the location aware sensors comprises auto-configuring the location aware sensors.

3. The method according to claim 1, further comprising:

associating the location aware sensors with respective ones of the one of the one or more
20 cooling system components.

4. The method according to claim 3, wherein the one or more cooling system components comprise vent tiles configured to deliver cooling fluid from the plenum into various locations in the room and wherein the step of detecting one or more conditions comprises
25 detecting one or more conditions of the cooling fluid delivered through the vent tiles.

5. The method according to claim 4, wherein the location aware sensors are attached to the vent tiles and wherein the step of manipulating the vent tiles comprises manipulating the vent tiles through control by the agents.

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6. The method according to claim 4, wherein the step of determining whether to manipulate at least one of the one or more cooling system components comprises determining whether the detected one or more conditions are within one or more predetermined ranges and wherein the step of manipulating at least one of the one or more cooling system components
5 comprises manipulating the vent tiles to vary cooling fluid flow through the vent tiles in response to the detected one or more conditions falling outside of the one or more predetermined ranges.

7. The method according to claim 3, wherein the one or more cooling system components comprise returns configured to remove cooling fluid from various locations in the
10 room and wherein the step of detecting one or more conditions comprises detecting one or more conditions of the cooling fluid removed through the returns.

8. The method according to claim 7, wherein the step of determining whether to manipulate at least one of the one or more cooling system components comprises determining
15 whether the detected one or more conditions are within one or more predetermined ranges and wherein the step of manipulating at least one of the one or more cooling system components comprises manipulating the returns to vary cooling fluid flow through the returns in response to the detected one or more conditions falling outside of the one or more predetermined ranges.

20 9. The method according to claim 3, wherein the one or more cooling system components comprise variable volume devices configured to supply cooling fluid from the plenum into various locations in the room and wherein the step of detecting one or more conditions comprises detecting one or more conditions of the cooling fluid in the plenum in the vicinities of the variable volume devices.

25 10. The method according to claim 9, wherein the step of determining whether to manipulate at least one of the one or more cooling system components comprises determining whether the detected one or more conditions are within one or more predetermined ranges and wherein the step of manipulating at least one of the one or more cooling system components
30 comprises manipulating the variable volume devices to vary cooling fluid flow through the

variable volume devices in response to the detected one or more conditions falling outside of the one or more predetermined ranges.

11. The method according to claim 3, wherein the one or more cooling system
5 components comprise controllable partitions configured to control cooling fluid pressure in associated areas of the plenum and wherein the step of detecting one or more conditions comprises detecting one or more conditions of the cooling fluid in the associated areas of the controllable partitions.

10 12. The method according to claim 11, wherein the step of determining whether to manipulate at least one of the one or more cooling system components comprises determining whether the detected one or more conditions are within one or more predetermined ranges and wherein the step of manipulating at least one of the one or more cooling system components comprises manipulating the controllable partitions to vary a pressure of cooling fluid in
15 respective associated areas in response to the detected one or more conditions falling outside of the one or more predetermined ranges.

13. The method according to claim 1, further comprising:
associating the location aware sensors with one or more agents; and
20 in the location aware sensors, transmitting the detected one or more conditions to an associated one of the one or more agents.

14. The method according to claim 13, wherein the one or more agents comprise rack or row agents and wherein the step of determining whether to manipulate at least one of the one
25 or more cooling system components is performed by the rack or row agents.

15. The method according to claim 14, further comprising:
in the one or more agents, transmitting information pertaining to manipulation of the least one of the one or more cooling system components to a room agent.

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16. The method according to claim 15, wherein the one or more cooling system components comprise a global cooling system component, said method further comprising:

in the room agent, determining whether to manipulate the global cooling system component; and

5 manipulating the global cooling system component in response to a determination to manipulate the global cooling system component.

17. The method according to claim 1, wherein the one or more agents comprise a room agent and wherein the step of determining whether to manipulate at least one of the one or
10 more cooling system components is performed by the room agent.

18. The method according to claim 1, further comprising:

in the location aware sensors, transmitting the detected one or more conditions to a computer system configured to control the one or more cooling system components.

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19. The method according to claim 18, further comprising:

in the computer system, determining whether to manipulate at least one of the one or more cooling system components; and

manipulating the at least one of the one or more cooling system components in response
20 to a determination to manipulate the at least one of the one or more cooling system components.

20. The method according to claim 19, wherein the one or more cooling system components comprise at least one local cooling system component and a global cooling system component, said method further comprising:

25 in the computer system, determining manipulations of the at least one local cooling system component; and

manipulating the global cooling system component in response to the determination of the at least one cooling system component manipulations.

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21. A system for controlling cooling fluid provisioning in a room housing a plurality of components, said room including at least one plenum having one or more cooling system components configured to vary a characteristic of at least one of cooling fluid supply to and removal from the room, said system comprising:

5 a plurality of location aware sensors positioned at various locations in the room, wherein the location aware sensors are positioned in respective vicinities of the one or more cooling system components, the location aware sensors being configured to determine their locations with respect to each other in a relatively autonomous manner;

10 a plurality of sensors configured to detect one or more conditions associated with the plurality of location aware sensors;

a controller configured to receive the detected one or more conditions from the plurality of sensors associated with the plurality of location aware sensors, said controller being configured to determine whether to manipulate at least one of the one or more cooling system components to modify a characteristic of cooling fluid contained in the plenum; and

15 wherein the controller is configured to manipulate at least one of the one or more cooling system components in response to a determination to that the at least of the one or more cooling system components is to be modified.

22. The system according to claim 21, wherein the one or more cooling system components comprises at least one of a vent tile, a return, a variable volume device, a controllable partition, and an air conditioning unit.

23. The system according to claim 21, wherein the one or more cooling system components comprises at least one vent tile, and wherein the controller comprises an agent assigned to the at least one vent tile, and wherein the agent is configured to control the at least one vent tile.

24. The system according to claim 23, wherein the agent is configured for relocation with the relocation of the at least one vent tile.

25. The system according to claim 21, wherein the controller comprises at least one of a rack or row agent, a room agent, and a computer system.

26. The system according to claim 21, wherein the plurality of location aware sensors are configured to wirelessly communicate with each other and the controller.

27. The system according to claim 21, wherein the controller comprises a plurality of agents, said plurality of agents being associated with particular areas in the room, and wherein said plurality of agents are configured to control at least one cooling fluid characteristic in an associated area of the room.

28. The system according to claim 21, wherein said one or more conditions comprises at least one of temperature, humidity, pressure, air flow, and vibration.

29. A system for controlling cooling fluid provisioning with location aware sensors in a room housing a plurality of components, said room including at least one plenum having one or more cooling system components configured to vary a characteristic of at least one of cooling fluid supply to and removal from the room, said system comprising:

means for determining the locations of the location aware sensors;

means for detecting one or more conditions with the location aware sensors;

means for determining whether to manipulate at least one of the one or more cooling system components to modify a characteristic of cooling fluid contained in the plenum; and

means for manipulating at least one of the one or more cooling system components in response to a determination to that the at least of the one or more cooling system components is to be modified.

30. The system according to claim 29, wherein the means for determining the locations of the location aware sensors comprises means for auto-configuring the location aware sensors.

31. The system according to claim 29, wherein the one or more cooling system components comprises at least one of a vent tile, a return, a variable volume device, a controllable partition, and an air conditioning unit.

32. The system according to claim 29, wherein the one or more cooling system components comprises at least one vent tile, and wherein the location aware sensor comprises an agent assigned to the at least one vent tile, and wherein the agent is configured to control the at least one vent tile.

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33. The system according to claim 32, wherein the agent is configured for relocation with the relocation of the at least one vent tile.

34. The system according to claim 29, further comprising:
means for controlling cooling fluid provisioning in respective various areas of the room;
and
wherein the location aware sensors are in communication with the means for controlling cooling fluid provisioning.

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35. The system according to claim 34, wherein the means for controlling cooling fluid provisioning comprises at least one of a rack or row agent, a room agent, and a computer system.

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36. A computer readable storage medium on which is embedded one or more computer programs, said one or more computer programs implementing a method of controlling cooling fluid provisioning with location aware sensors in a room housing a plurality of components, said room including at least one plenum having one or more cooling system components configured to vary a characteristic of at least one of cooling fluid supply to and removal from the room, said one or more computer programs comprising a set of instructions for:

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determining the locations of the location aware sensors;

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detecting one or more conditions with the location aware sensors;

determining whether to manipulate at least one of the one or more cooling system components to modify a characteristic of cooling fluid contained in the plenum; and

manipulating at least one of the one or more cooling system components in response to a determination to that the at least one of the one or more cooling system components is to be modified.

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37. The computer readable storage medium according to claim 36, said one or more computer programs further comprising a set of instructions for:
auto-configuring the location aware sensors.

5 38. The computer readable storage medium according to claim 36, said one or more computer programs further comprising a set of instructions for:
associating the location aware sensors with one or more agents; and
in the location aware sensors, transmitting the detected one or more conditions to an associated one of the one or more agents.

10 39. The computer readable storage medium according to claim 38, said one or more computer programs further comprising a set of instructions for:
in the one or more agents, manipulating at least one of the one or more cooling system components in response to the detected one or more conditions.

15 40. The computer readable storage medium according to claim 36, said one or more computer programs further comprising a set of instructions for:
in the location aware sensors, transmitting the detected one or more conditions to a computer system configured to control the one or more cooling system components.

20 41. The computer readable storage medium according to claim 40, said one or more computer programs further comprising a set of instructions for:
in the computer system, determining whether to manipulate at least one of the one or more cooling system components; and
25 manipulating the at least one of the one or more cooling system components in response to a determination to manipulate the at least one of the one or more cooling system components.

30 42. The computer readable storage medium according to claim 41, wherein the one or more cooling system components comprise at least one local cooling system component and a global cooling system component, said one or more computer programs further comprising a set of instructions for:

in the computer system, determining manipulations of the at least one local cooling system component; and

manipulating the global cooling system component in response to the determination of the at least one cooling system component manipulations